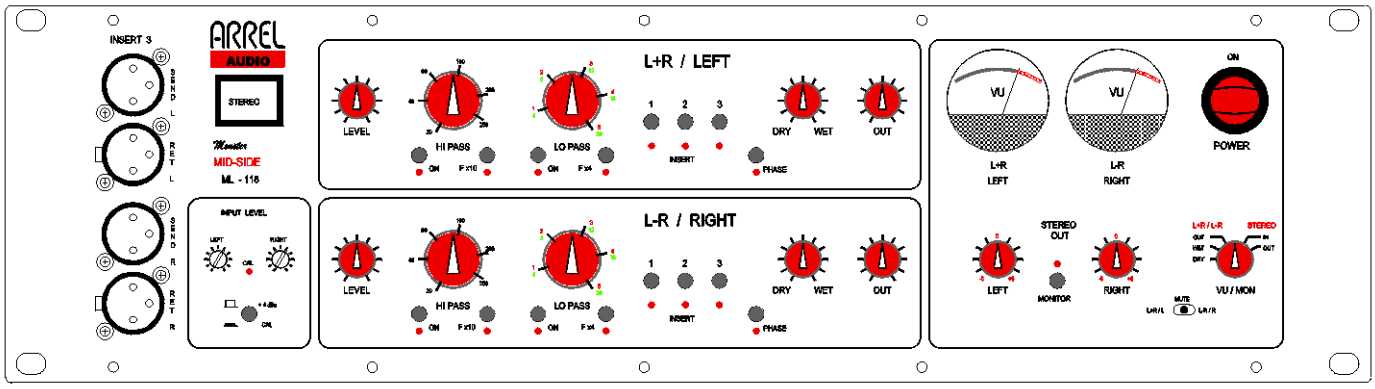
REAL Innovation

ML–118
Mastering Mid-Side Unit



User Manual

Issue 0.2

SAFETY INSTRUCTIONS

⚠ *WARNING*

Always follow the precautions listed below to avoid any possibility of serious injury or even death from electrical shock, short-circuiting, damages, fire or other hazards. These precautions include, but are not limited to, the following:

- Do not expose the instrument to liquids and rain. Do not use it near water or in damp or wet conditions, or place containers on it containing liquids. If any liquid seeps turn off the power and unplug the power cord from the AC outlet.
- Do not put burning items, such as candles, on the unit. A burning item may fall over and cause a fire.
- This instrument contains no user-serviceable parts. Do not open the instrument or attempt to disassemble or modify the internal circuit.
- Never insert or remove an electric plug with wet hands.
- Check the electric plug periodically and remove any dirt or dust which may have accumulated on it.
- Do not place the power cord near heat sources such as heaters or radiators, and do not excessively bend or otherwise damage the cord, place heavy objects on it, or place it in a position where anyone could walk on, trip over, or roll anything over it.

⚠ *CAUTION*

Always follow the precautions listed below to avoid any possibility of serious injury or even death from electrical shock, short-circuiting, damages, fire or other hazards. These precautions include, but are not limited to, the following:

- Do not connect the instrument to an electrical outlet using a multiple-connector. Doing so can result in lower sound quality, or possibly cause overheating in the outlet itself.
- When removing the electric plug from the instrument or an outlet, hold the plug itself and not the cord. Pulling by the cord can damage it.
- Remove the electric plug from the outlet when the instrument is not to be used for extended periods of time, or during electrical storms.
- Do not place the instrument in an unstable position where it might accidentally fall over.
- Before moving the instrument, remove all connected cables.
- When setting up the product, make sure that the AC outlet you are using is easily accessible. If some trouble or malfunction occurs, immediately turn off the power switch and disconnect the plug from the outlet. Even when the power switch is turned off, electricity is still flowing to the product at the minimum level.
- When you are not using the product for a long time, make sure to unplug the power cord from the wall AC outlet.
- Use only the stand/rack specified for the instrument. When attaching the stand or rack, use the provided screws only. Failure to do so could cause damage to the internal components or result in the instrument falling over.

Information for Users on Collection and Disposal of Old Equipment

This special symbol on the products, packaging, and/or accompanying documents means that used electrical and electronic products should not be mixed with general household waste.
For proper treatment, recovery and recycling of old products, please take them to applicable collection points, in accordance with your national legislation and the Directives 2002/96/EC.
By disposing of these products correctly, you will help to save valuable resources and prevent any potential negative effects on human health and the environment which could otherwise arise from inappropriate waste handling.
For more information about collection and recycling of old products, please contact your local municipality, your waste disposal service or the point of sale where you purchased the items.
[For business users in the European Union]
If you wish to discard electrical and electronic equipment, please contact your dealer or supplier for further information.
[Information on Disposal in other Countries outside the European Union]
This symbol is only valid in the European Union. If you wish to discard these items, please contact your local authorities or dealer and ask for the correct method of disposal.

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INTRODUCTION

The **ARREL Audio ML-118** is a new MID-SIDE unit characterized by an outstanding sound quality and a number of new functions that are not available on other MID-SIDE units available on the market.

The **ML-118** is an advanced Mid/Side analog processor designed by ARREL Audio to comply with the demands of professional recording and mastering engineers. Mid/Side processing is based on the coding of a stereo signal into two components. The “Mid” channel contains the information that appears in both the left and right channels, and the “Side" channel contains all the information that differs between the left and right channels.

Once encoded into M/S, these two signals can be processed independently, before being decoded back into L and R channels. The M/S technique gives more control over the width of the stereo image than techniques based on microphone placement techniques. The Monster MS is a code/decode mono/stereo system to be used primarily for mastering sessions but it will perform outstandingly also as a stereo effects unit and as a mastering console.

On top of its amazing sound quality, the Monster MS unit features a unique set of functions never seen before in similar units. The L+R and L-R channels are equalized in amplitude by suitable gains at +4 dBu in order to obtain the maximum Signal/Noise ratio and the optimum headroom in the audio path. This fact is important when compressors/limiters are used as inserts in the MID-SIZE audio path.

Each L+R and L-R processing section contains a HI-PASS and a LO-PASS filter that can be selected by pressing the HI-PASS/LO-PASS button. The filters are characterized by two working bands selected by pressing the corresponding buttons (Fx10 and Fx4), the cut off frequency is adjustable by a potentiometer.

HI-PASS filter parameters: Range 20-250 Hz or 200-2500 Hz (F x 10 button pressed). LO-PASS filter parameters: Range 1-5 KHz or 4-20 KHz (F x 4 pressed). The filters slope is -12dB/Oct.

Three INSERT points are available to connect outboards. INSERT 1 and 2 are available on the DB-25 connector on the back panel. This connection is useful for effects that are often used in the audio path. INSERT 3 connectors are located on the front panel (XLR connectors). This is useful for on the fly outboard connections. The unit provides a Phase Inversion button to reverse the phase of the wet signal (addition and subtraction of the effect). The wet and dry signals can be mixed together.

A bypass switch (illuminated by a LED) can turn the device into a Stereo unit, making the Monster MS an effects unit perfectly integrated in an external signal processing chain. The Monster MS features 2 multifunction VU meters that the user can set to display a variety of important data such as: input stereo level, post L+R/L-R levels, post processing L+R/L-R level, L+R/L-R output level and output stereo level.

To obtain an outstanding audio quality, no servo amplifiers are used in the **ML-118** so

IT IS NOT POSSIBLE TO UNBALANCE THE LINE OUT OF THE ML-118.

If you need an unbalanced connection for the line out there follow the instructions in APPENDIX A.
The block diagram of the unit is illustrated in APPENDIX D.

Housing and Rack Mounting

The MS-118 has been designed to be compliant with a 3U rack. No specific air conditioning is required for the racks, provided that there is a free flow of air through the rack from front to back and the temperature is maintained in the operating range. Consequently the racks may be stacked.

ML-118 FRONT PANEL CONTROLS AND OPERATIONS

INPUT STAGE

The ML-118 input stage is based on a differential amplifier so it is “electronically balanced”. The standard input level for the ML-118 is + 4dBu.
In case of different or non-standard line input levels, the CAL switch can be used to add a make-up gain. The gain is adjusted by rotating the CAL trimmer (use a small flat-head screwdriver). The gain the range is [0, 10 dB].
In the case of unbalanced inputs the connection scheme indicated in APPENDIX A must be used.

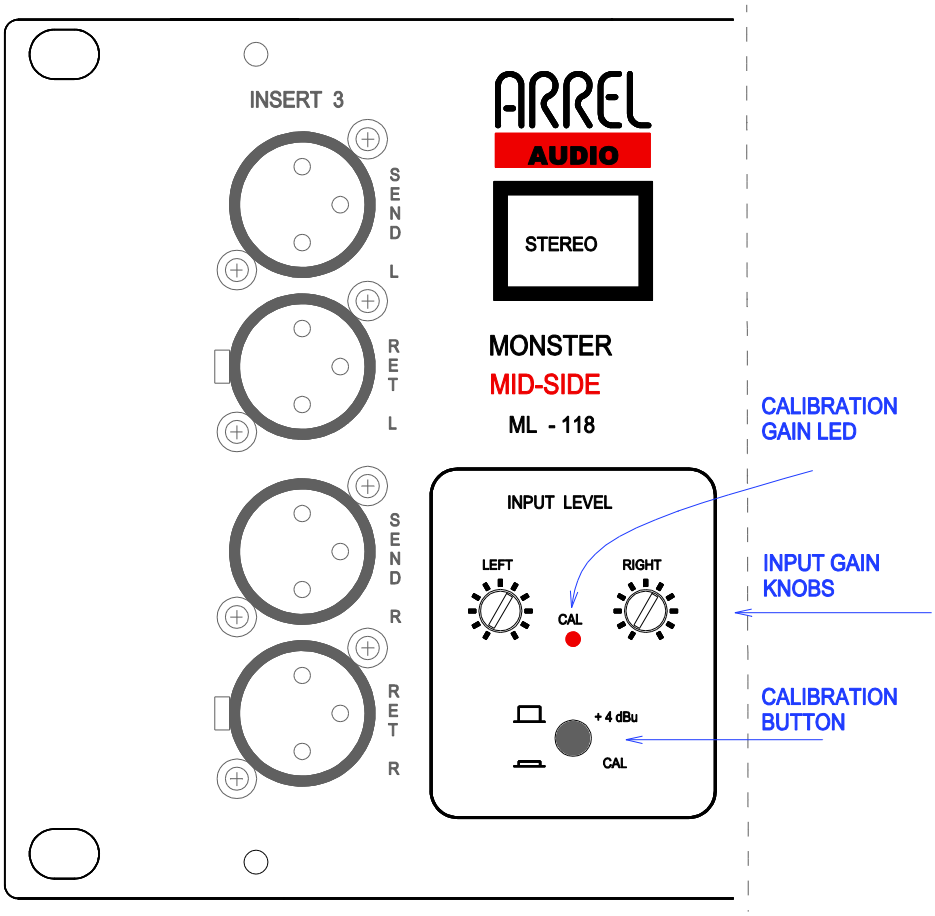


Fig. 1 Input Section

In order to monitor the input level the **VU/MON** switch must be rotated in the **STEREO (IN)** position. In the case of custom gain (calibration button pressed) the level is monitored after the calibration make-up gain.

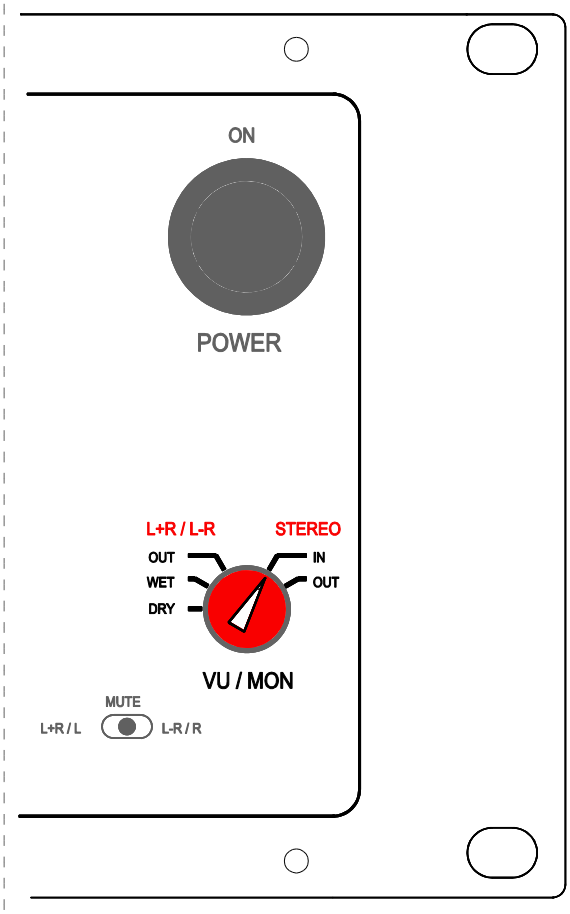


Fig. 2 VU/MON switch for monitoring the input level

CODING SECTION

After the input stage, the **L** and **R** audio signals are processed by the analog processor (matrix) to obtain the **L+R** and **L-R** signals.
The **L+R** signal being the summation of two signals is in the range [0, +6dB], while the **L-R** signal is in the typical range of [0, -60 dB] (usually -20 dB). Those levels are typical levels and their value depends exclusively on the characteristics of the **L** and **R** signals.
The **L+R** and **L-R** channels are equipped with separate gains with suitable gain ranges amplified by suitable gains to obtain a +4 dBu signal. This fact is important when compressors/limiters are used as inserts in the MID-SIZE audio path.

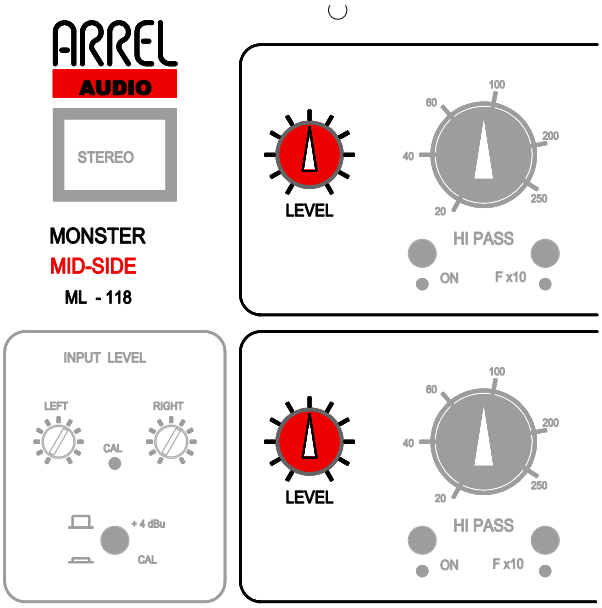


Fig. 3 **L+R**, **L-R** channel gain

In order to monitor the level at the output of the analog matrix, the **VU/MON** switch must be rotated in the **L+R/L-R (DRY)** position (FIG. 4) (after the make-up gain stage before the filters/insert points).

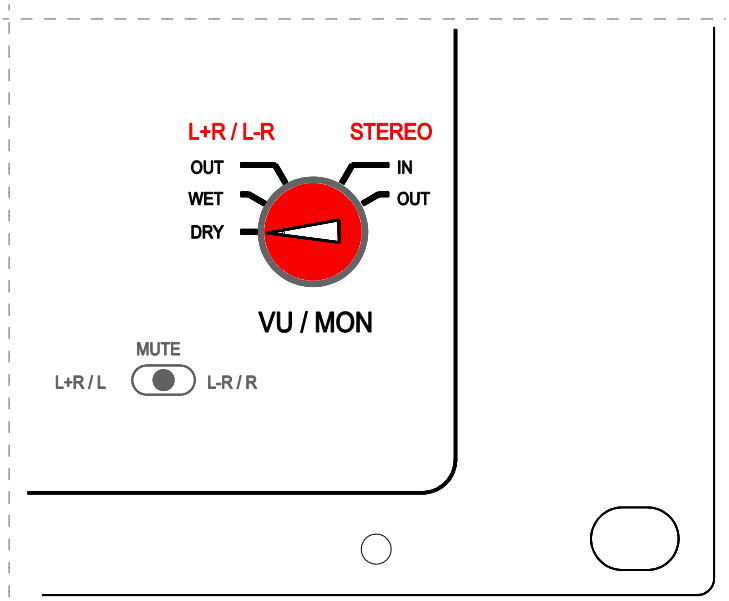


Fig. 4 VU/MON switch for monitoring the post-coding level (**DRY**).

The two **L+R** ed **L-R** audio chains are characterized by the same analog processing functions that are illustrated in the follow paragraphs.

FILTER SECTION

Each **L+R** ed **L-R** processing section contains a **HI-PASS** and a **LO-PASS** filter that can be selected by pressing the **HI-PASS/LO-PASS** button. The activation of the filter is

indicated by the corresponding LED on.
In this way you can obtain low pass or high pass processing but also a band pass filter if the two filters are both ON.
The filters are characterized by two working bands selected by pressing the corresponding buttons (Fx10 and Fx4), the cut off frequency is adjustable by a potentiometer.

HI-PASS filter parameters: Range 20-250 Hz or 200-2500 Hz (F x 10 button pressed).
LO-PASS filter parameters: Range 1-5 KHz or 4-20 KHz (F x 4 pressed).

Filters Roll-off 12 dB/Oct for both filters (Fig. 5).

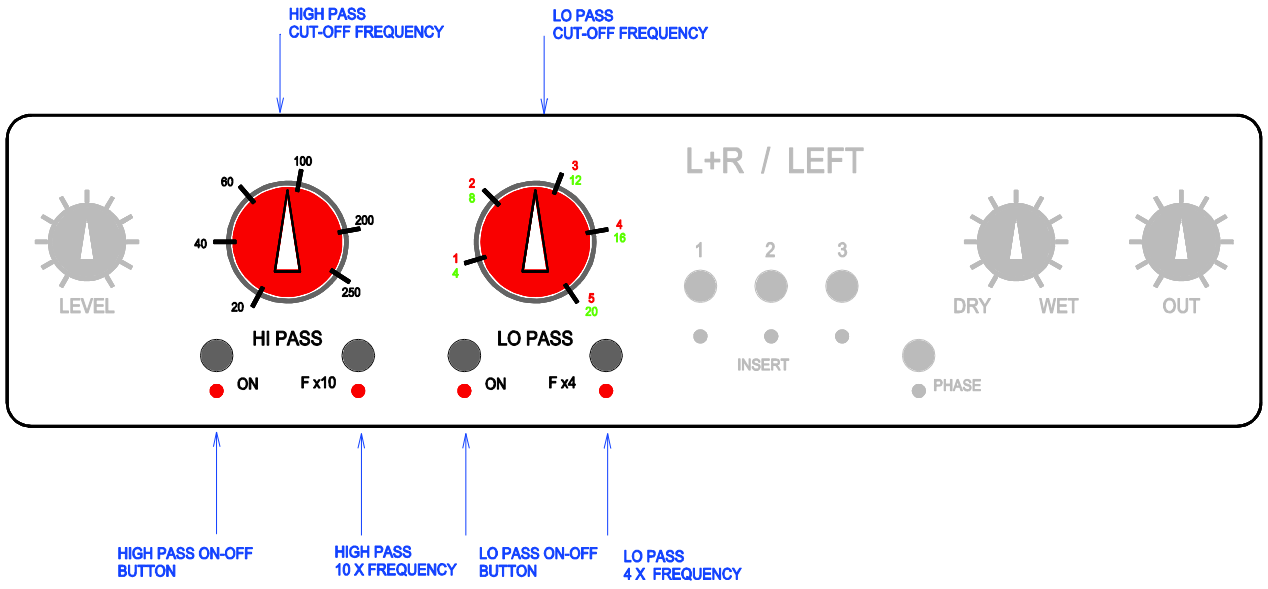


Fig. 5 **L+R** filtering section

INSERT SECTION

Three different **INSERT** points are available to connect outboards. **INSERT 1** and **2** are available on the DB-25 connector on the back panel (see APPENDIX B). This connection is useful for effects that are often used in the audio path.

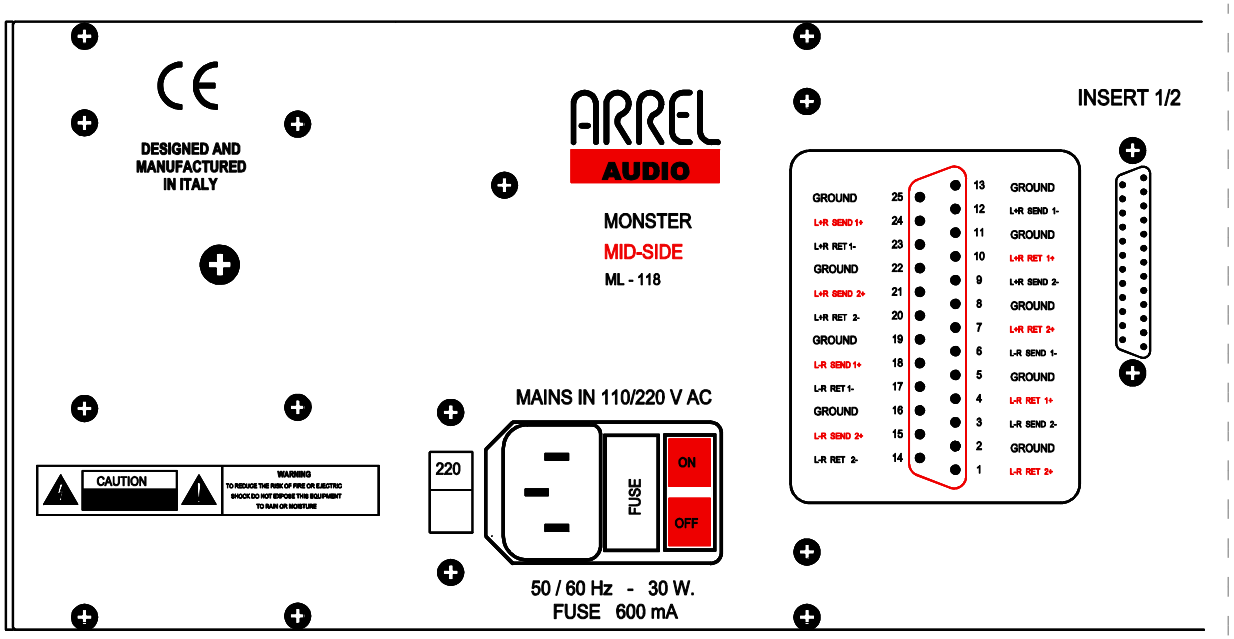


Fig. 6 DB-25 connector on the back panel, **INSERT 1/2**

INSERT 3 connectors are located on the front panel (XLR connectors). This is useful for on the fly outboard connections.

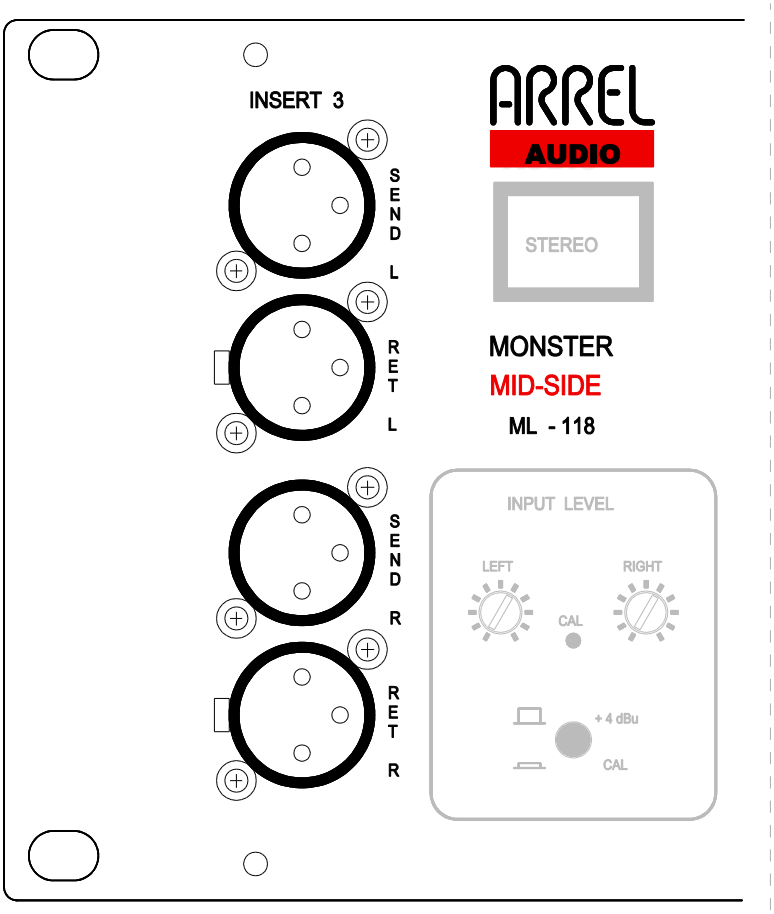


Fig. 7 XLR connectors on the front panel, **INSERT 3**

INSERT 1/2/3 are selected by pressing the corresponding INSERT button as indicated in FIG. 8. The **SEND** out is electronically balanced. To obtain an outstanding audio quality, no servo amplifiers are used in the **ML-118** so

IT IS NOT POSSIBLE TO UNBALANCE THE SEND OUT OF THE ML-118.

If you need an unbalanced connection for the **SEND** out follow the indications shown in APPENDIX A.
The **RETURN** input is electronically balanced.

IT IS POSSIBLE TO UNBALANCE THE RETURN OF THE ML-118.

If you need an unbalanced connection for the **RETURN** input follow the indications shown in APPENDIX A.

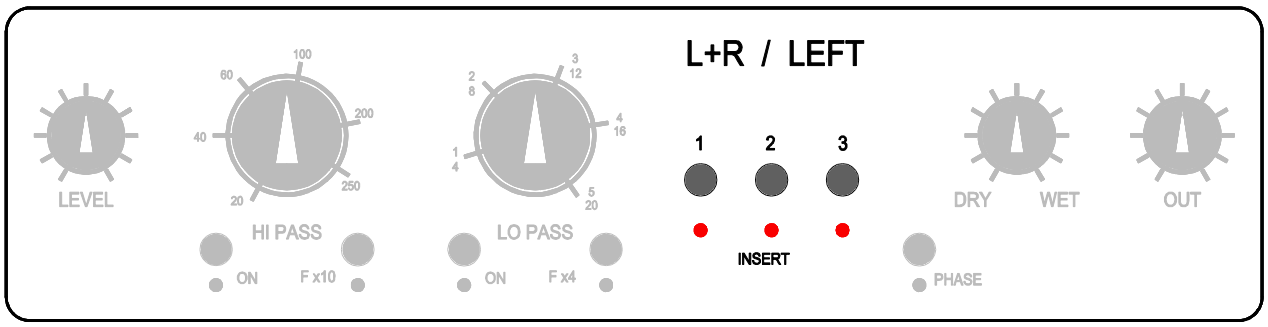


Fig. 8 **L+R INSERT** selection buttons

PHASE REVERSE

This function, controlled by the **PHASE** button (FIG. 9) and the corresponding LED, reverts the audio signal phase. This processed signal can be added or subtracted to the original signal by using the DRY/WET knob.

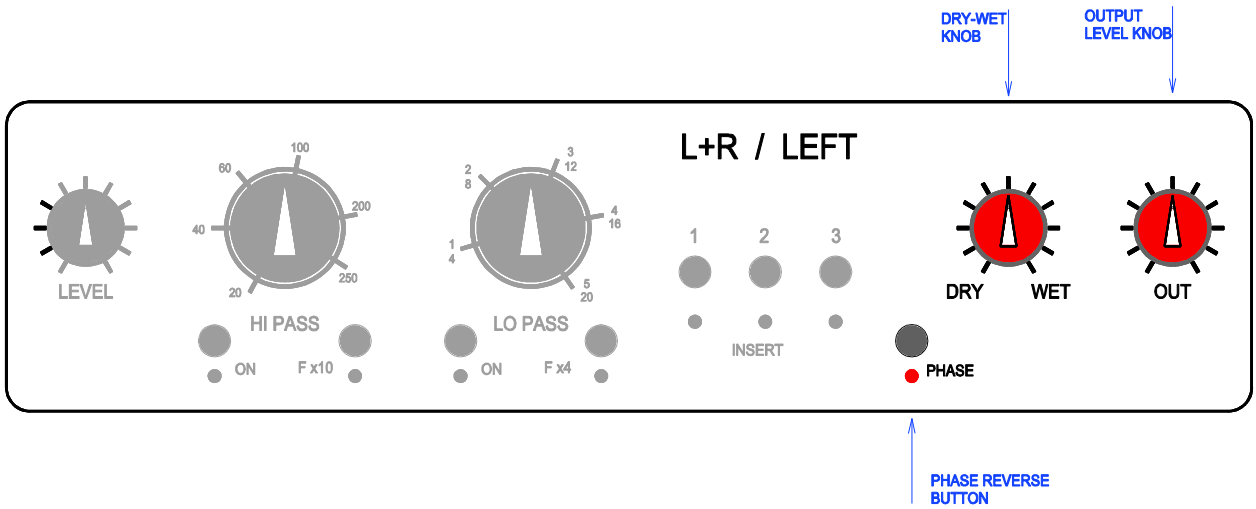


Fig. 9 Phase Reverse button, Output level, DRY-WET

In order to measure the level of the post elaborated **L+R/L-R** signals, the **VU/MON** switch must be rotated in the **L+R/L-R (WET)** position (FIG. 10).

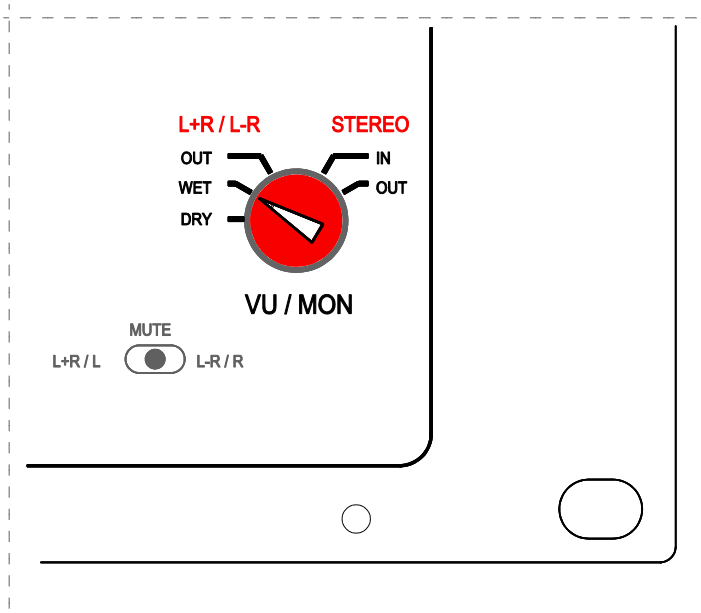


Fig. 10 VU/MON switch for monitoring the level of the processed signal (WET) (before the OUT level potentiometer).

DRY-WET

By using this control, the **DRY** signal and **the WET** signal are mixed (Fig. 9).

OUTPUT LEVEL

Those controls are used to change the level at the output of the **L+R** and L**-R** chains (Fig. 9)**.** In order to measure the output level of the **L+R/L-R** signals, the **VU/MON** switch must be rotated in the **L+R/L-R (OUT)** position (Fig. 10). This measurements represent the level of the mixed **WET** and **DRY** signal.

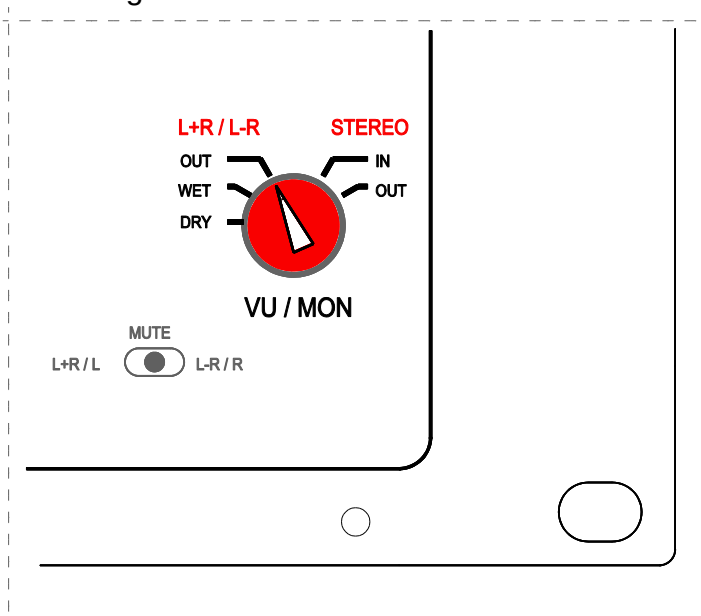


Fig. 11 VU/MON switch for monitoring the output level of the elaborated signal (WET) (after the OUT level potentiometer).

The **L+R** output level potentiometer is the main control due to the fact that the **L+R** signal contains the mono information.
The **L-R** output level potentiometer vice versa controls the information that is required to recreate the stereo image effect.

STEREO OUT

The two potentiometers (center detent) illustrated in Fig. 11 are used to change the level of the decoded (analog matrix) **LEFT** and **RIGHT** signals. The gain range is ± 6 dB.
The **L/R** outs are electronically balanced. To obtain an outstanding audio quality, no servo amplifiers are used in the **ML-118** so

IT IS NOT POSSIBLE TO UNBALANCE THE L/R OUT OF THE ML-118.

If you need an unbalanced connection for the **L/R** out follow the indications shown in APPENDIX A.

In order to measure the output level after the decode (L/R) the **VU/MON** switch must be rotated in the **STEREO (OUT)** position (Fig. 11). Please take into account that this measurement is not affected by the LEFT/RIGHT gains (the measurement point is before those potentiometers)

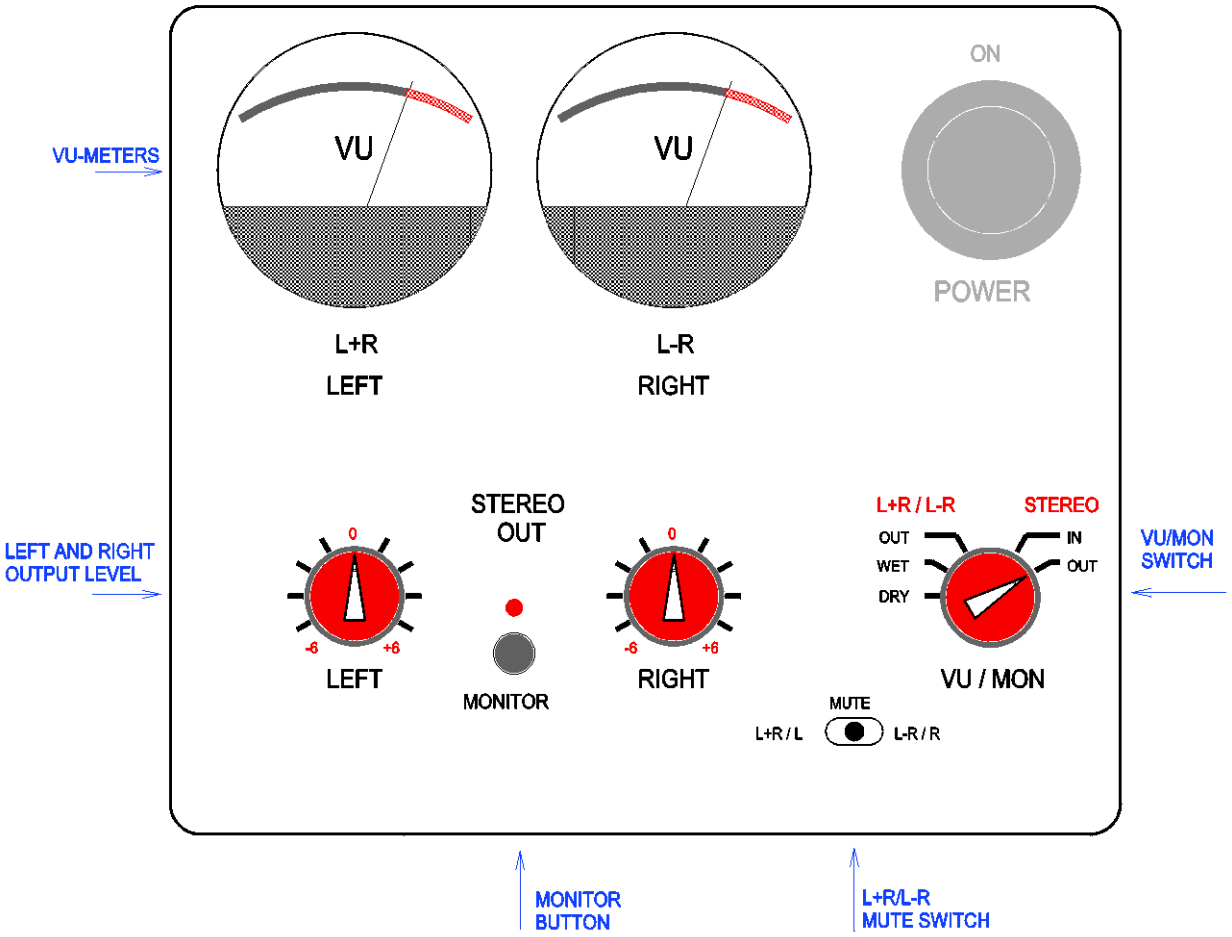


Fig. 12 Output and monitor section

MONITOR

By pressing the MONITOR button (Fig. 11) the signals selected by rotating the VU/MON switch are sent to the main outputs (LED indicator).
In this way the user is able to measure and also to listen the signals in all the important points of the audio path.

MUTE FUNCTION

Of real practical importance is the MUTE function. It permits to monitor the **L+R** and the **L-R** channel separately (Fig. 11)**.**
The **MUTE** command affects only the monitor output and not the corresponding signals measured by the VU Meters (see APPENDIX C: Block Diagram).

STEREO MODE BUTTON

This button (LED indicator) is used to by-pass the MS coding matrix (see APPENDIX D: Block Diagram). In this configuration, the **ML-118** works as a stereo unit (Fig. 13).
This configuration is very useful in different practical situations (APPENDIX D: External connections) .
The stereo mode transform the ML-118 is a true analog hub useful to obtain the maximum productivity from your outboards in an easy way.
In APPENDIX E several examples show how to configure the ML-118 to obtain: a de-

esser, a parallel compression scheme, a mono fine compression scheme, notch and band pass filtering.

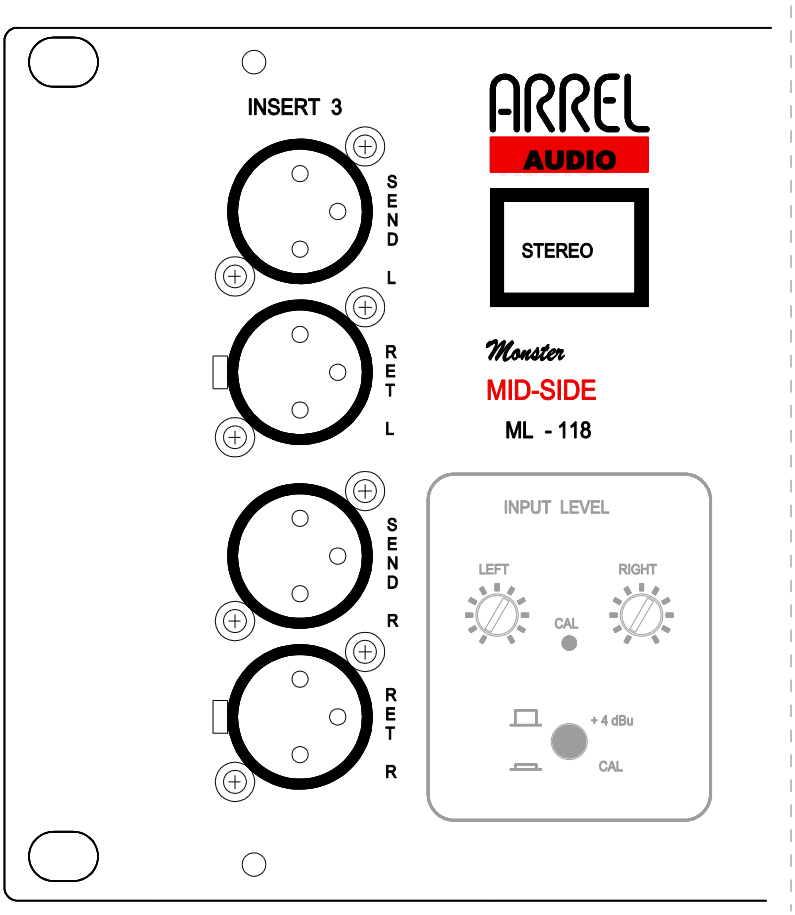


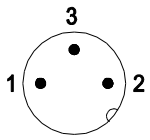
Fig. 13 **STEREO** button

APPENDIX A: External connections

ARREL AUDIO

WIRING ML - 118

LINE INPUT — XLR — On the back

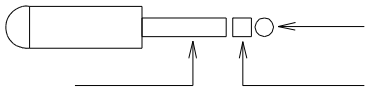


1 = Ground
2 = PHASE +
3 = PHASE -

Balanced line - Can be unbalanced

INSERT SEND — DB25 — On the back

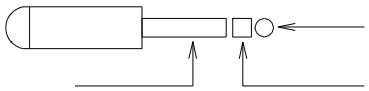
TRS Jack 1/4" — On the front panel



Balanced line only - Do not connect unbalanced line

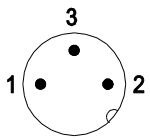
INSERT RETURN — DB 25 — On the back

TRS Jack 1/4"



Balanced line - Can be unbalanced

MAIN OUTPUT — XLR — On the back



1 = Ground
2 = PHASE +
3 = PHASE -

Balanced line only - Do not connect unbalanced line

Fig.14 ML-118 external connections

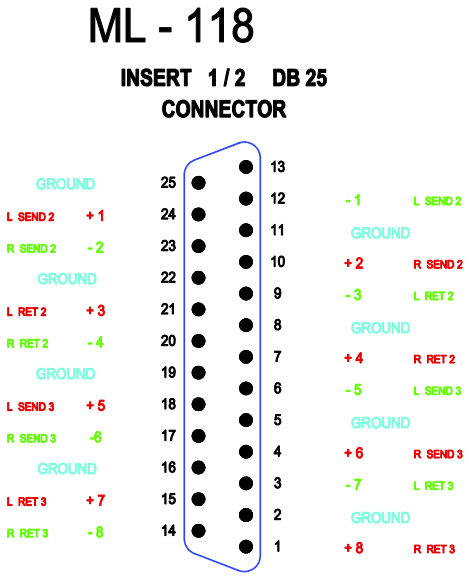


Fig.15 ML-118 DB-25 Connector

APPENDIX B: Front Panel

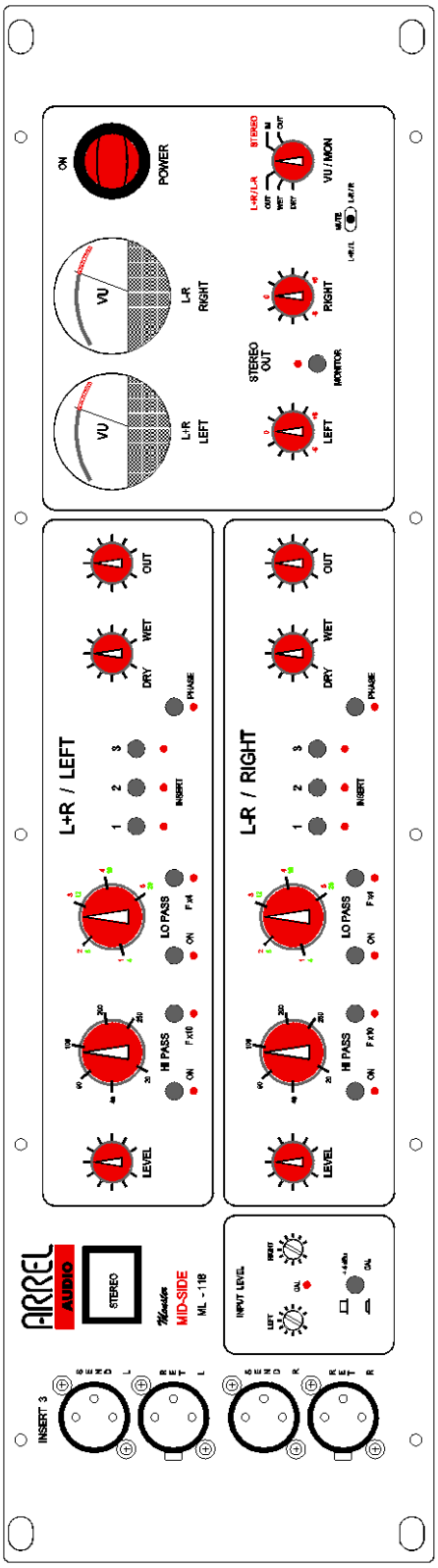


Fig.16 ML-118 front Panel

APPENDIX C: Back Panel

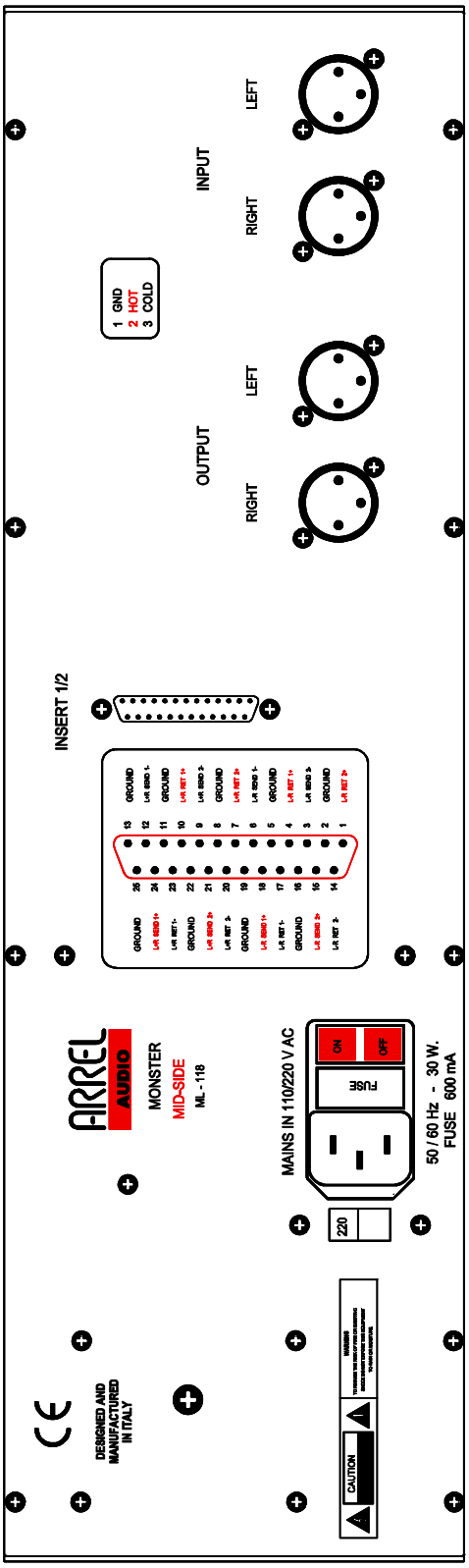


FIG.17 ML-118 Back Panel

APPENDIX D: BLOCK DIAGRAM

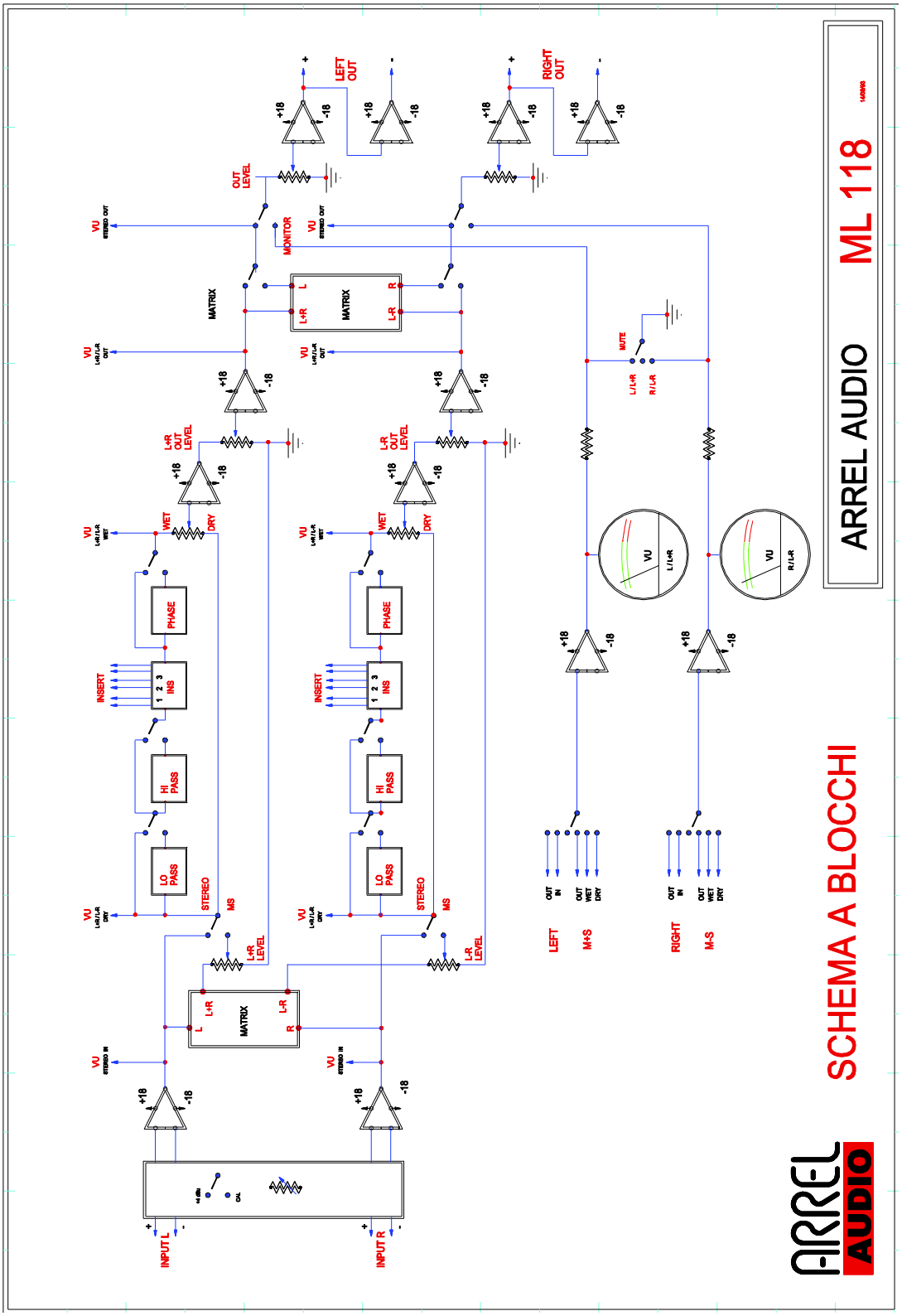


FIG.18 ML-118 Block Diagram

APPENDIX E: Stereo Mode Applications

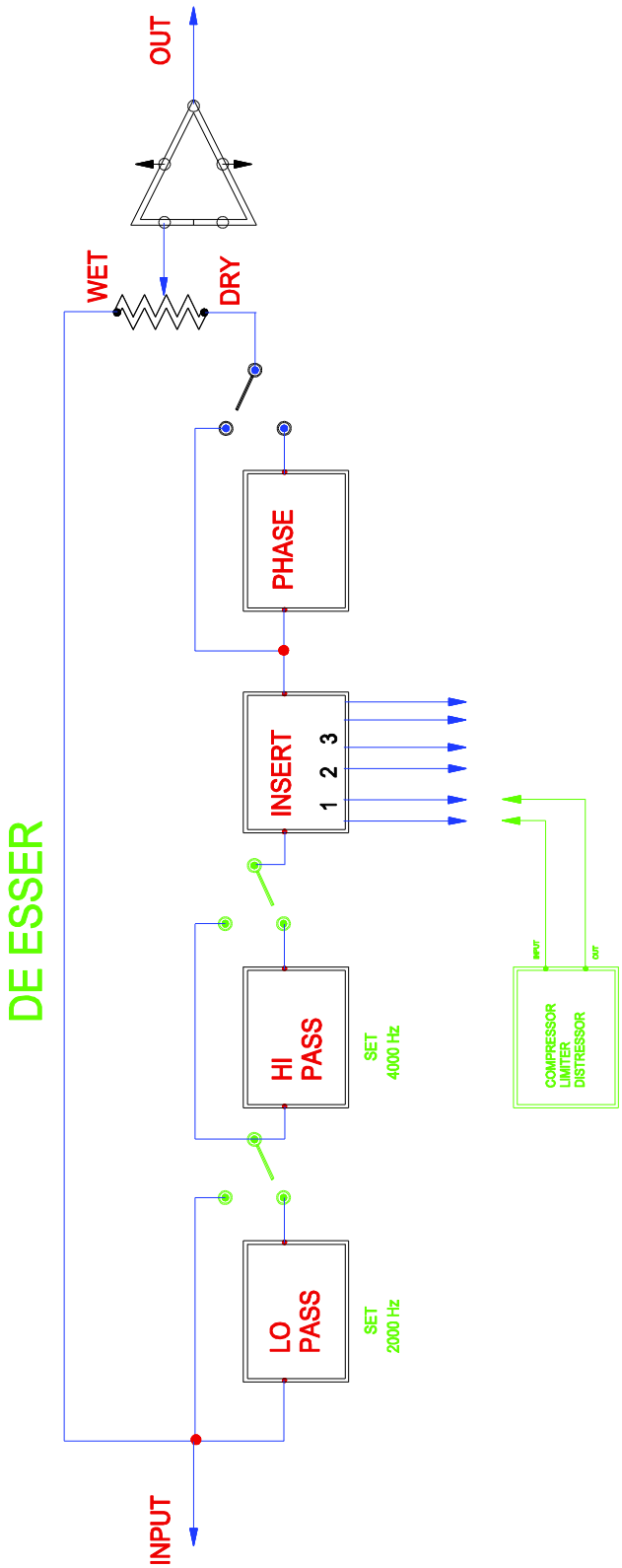


FIG.19 ML-118 Stereo Mode: De-Esser

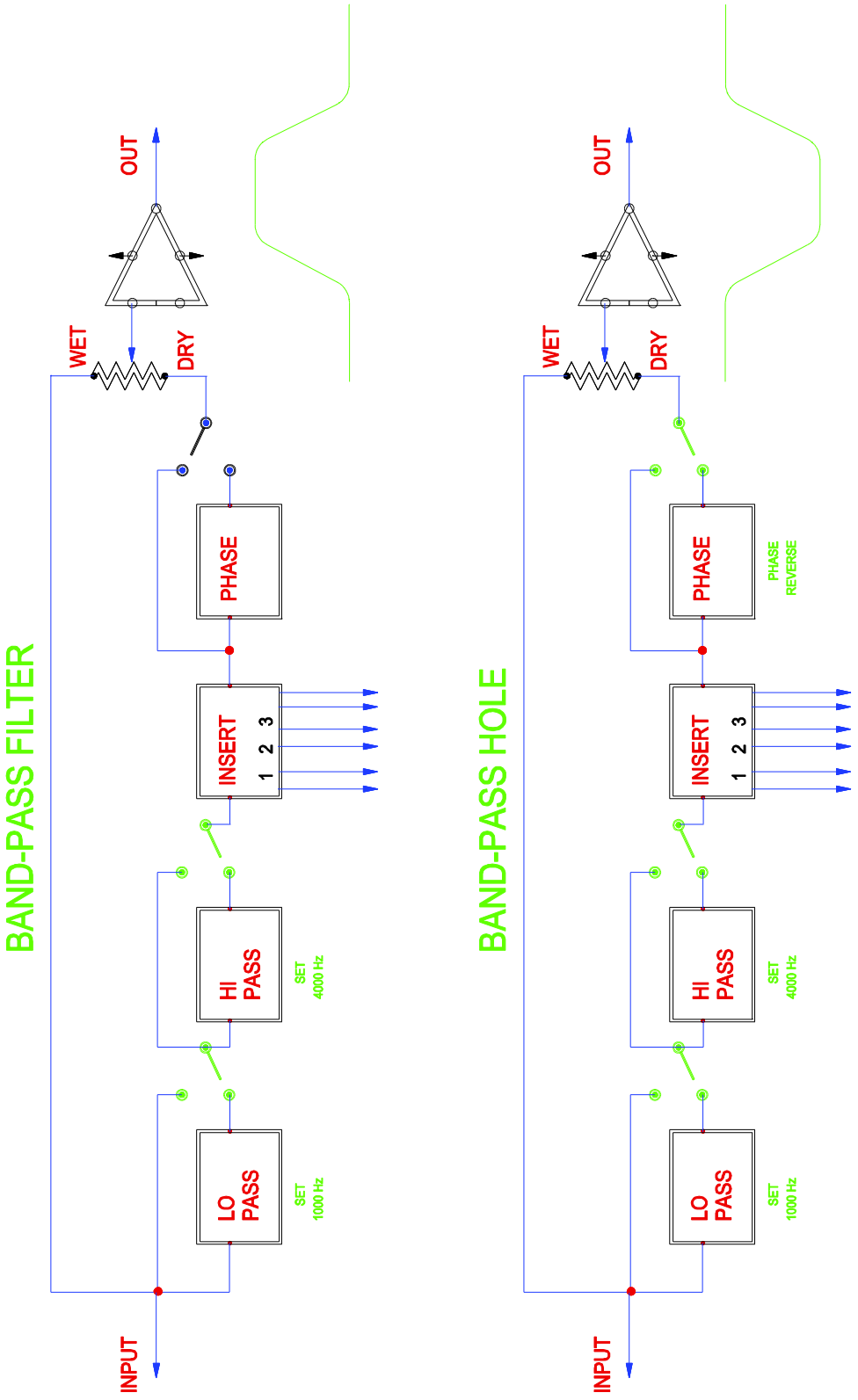


FIG.20 ML-118 Stereo Mode: Band Pass and Notch Filtering

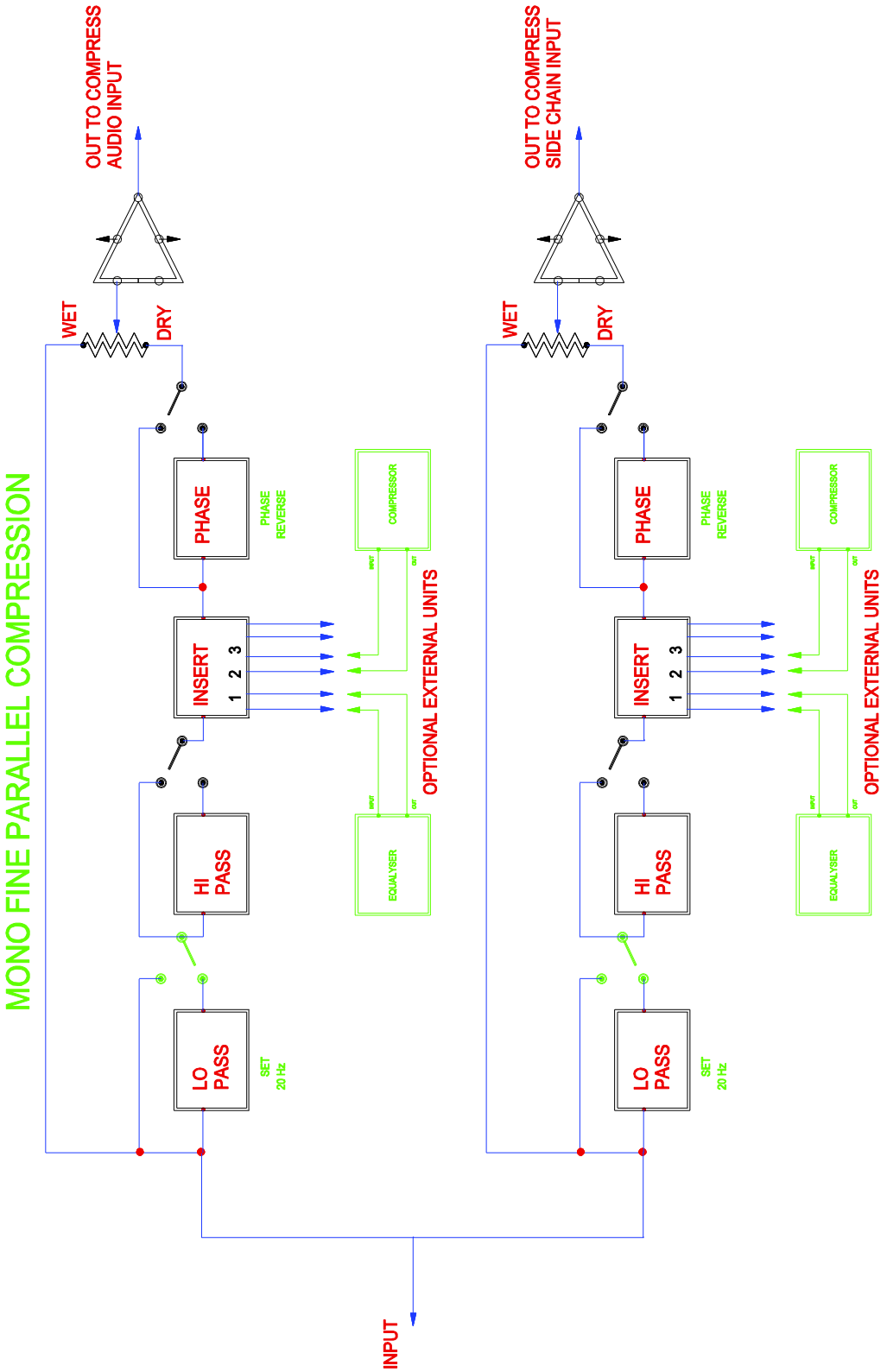


FIG.21 ML-118 Stereo Mode: Mono Fine Compression

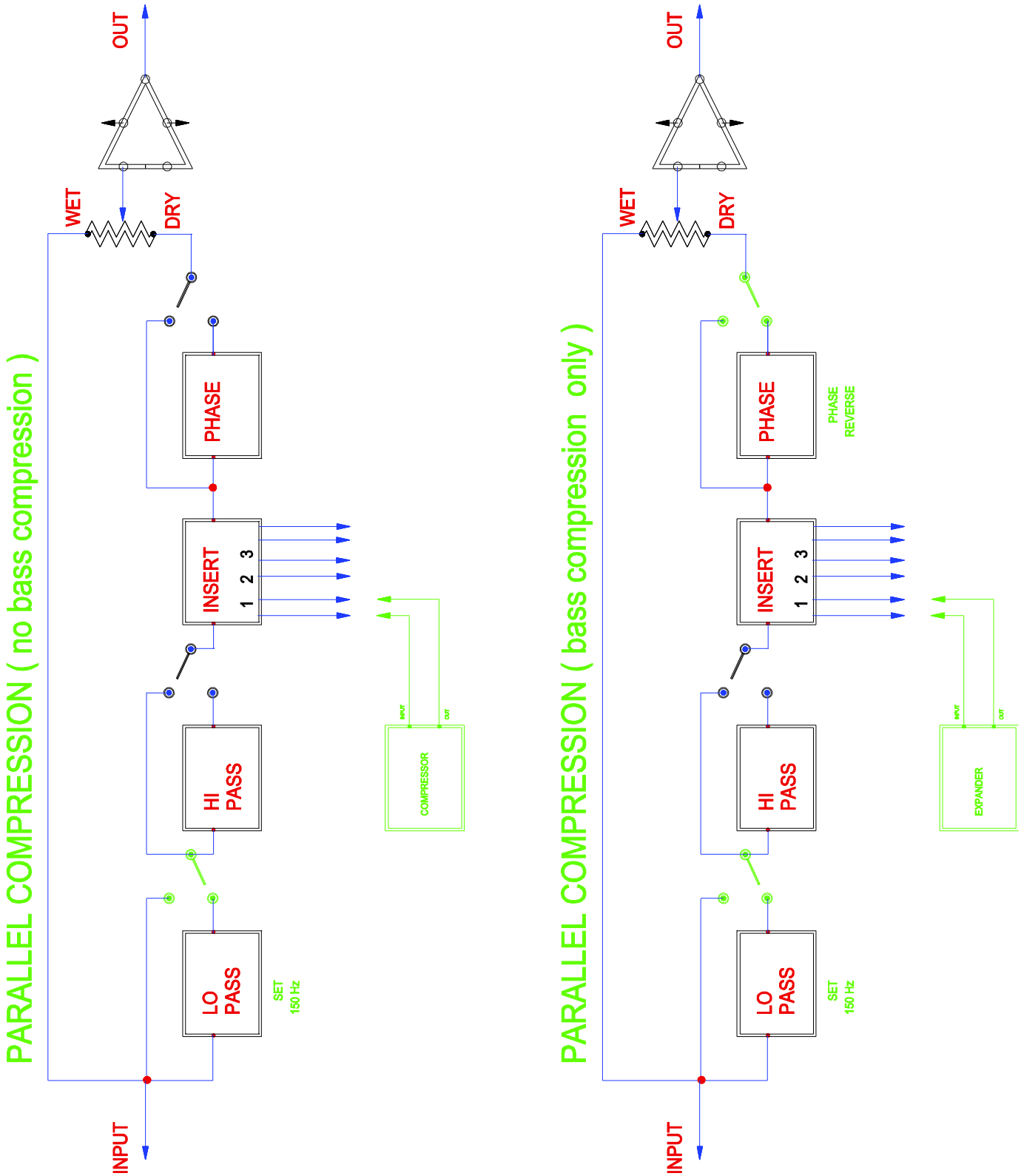


FIG.22 ML-118 Stereo Mode: Parellel Compression

TECHNICAL SPECIFICATIONS

Power Supply	Linear Regulator (Balanced C-Core Transformer)
Operating Voltage	220V 50 Hz/ 110 V 60 Hz switch
Power Consumption	30 W
Input	Electronically balanced, Impedance > 10 KΩ
Channel Gains	L+R: from -10 to +6 dB, L-R: from -22 to +4 dB.
Master Output	Electronically balanced, Output Impedance 50 Ω. (minimum external load 600Ω).
Master Level	Level +4dBu, Max +28dBu.
Bandwidth	5 - 200.000 Hz -1dB, perfect square wave up to 20 KHz
Distortion + Noise	<0.005% (typical 0.001 %).
L+R, L-R Filters	HI-Pass with 2 frequency ranges (20-250Hz and 200-2500Hz), LO-pass with 2 frequency ranges (1-5kHz and 4-20kHz).
Front Panel Input Section Controls	Left/Right level POTs +14/-10dBu, Calibration button and Calibration trimmer for non-standard input levels.
Front Panel Channels Controls	Level pot (L+R:-10/+6dB, L-R:-22/+4dB), HI-Pass cut-off frequency pot (20-250Hz and 200-2500Hz), LO-Pass cut-off frequency pot (1-5kHz and 4-20kHz), HPF-LPF on/off buttons, HPF: Freq x 10 button, LPF: Freq x4 button, 3 x bypass buttons (Ins 1, Ins 2, Ins 3), Phase Reverse button, DRY/WET level pot, Output level pot +4dBu (max +28dBu).
Front Panel Master Monitor Section Controls	2 x Level Pots (± 6dB) with center detect (Left,Right), Monitor button, 3-way MUTE toggle switch (L+R/Left Off, Off, L-R/Right Off), 5-step rotary switch for L+R/L-R mode: (Dry, Wet, Out,) and Stereo mode (In, Out), Backlighted stereo mode button, Illuminated Power On/Off switch.
Front Panel Indicators	1x LED (calibration), Input section per channel: 4 x LEDs (HPF On, Freq x10 On, LPF On, Freq x4 On), 3 LEDs (Ins 1, Ins 2, Ins 3 bypass), 1 x LED (Phase) Master/Monitor section: 1 LED (Monitor), 2 x Electromechanical VU meters (LED Backlighed).
Front Panel Connectors	2 x Balanced XLR female for Insert 3 (Send L-R), 2 x Balanced XLR male for Insert 3 (Return L-R).
Rear Panel Input Connectors	2 x Balanced XLR female.
Rear Panel Output Connectors	2 x Balanced XLR male.

Rear Panel Insert Connectors	1 x DB25 female for Insert 1 and-2 (Send & Return 1, Send & Return 2).
Rear Panel Master Connectors	DB25 female (Main L/R, Monitor L/R, Send L/R, Return L/R).
Rear Panel AC mains	IEC C13 16 A connector, AC mains cord with IEC Schuko 16A.
Rear Panel Main Switch	Power On/Off switch.
Construction	19" 3U rack mount metal box
Dimensions	W 483 mm / 19”, H 133,35 mm/1.75” (1 RU), D 225 mm / 8.86”.
Weight	6 kg.